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THE THEORY OF INTERACTION.[1]

THE question concerning the relation between mind and body has occupied the center of philosophical interest since the days of Descartes. Of recent years the drift of opinion has been largely in the direction of parallelism, the theory which denies that there can be a causal relation between the mental and physical realms. Leading authorities, men like Lange, Wundt, Riehl, Bain, Höffding, Paulsen, Münsterberg, and Jodl have accepted parallelism, and accuse their opponents of contradicting the fundamental principles of natural science. But the weight of these names has not been able to silence all opposition. The controversy is breaking out anew in Germany, and the theory of interaction is gaining a large number of supporters.[2] In view of these facts it will not be out of place to bring up this subject again, and to consider how the problem stands at present.

The theory of interaction, which is really the common-sense theory, maintains that states of consciousness are causes of changes in the physical world, and physical occurrences the causes of changes in consciousness. This assertion the parallelists deny on various grounds. Some reason as follows:[3]

The fundamental law of mind is the principle of identity, according to which whatever is is, and nothing can both be and not be. From this principle the principle of sufficient reason necessarily follows: nothing can happen without a sufficient reason for its happening. Applied to the phenomena of nature, this axiom becomes the law of causality, the fundamental principle of science. This law holds that every effect must have its cause, that nothing can happen without a ground. Nothing in nature can therefore be created out of nothing, for if it could we should have an effect without a cause. Nor can anything be lost or disappear, for if it could we should have a cause without an effect. The axiom, that nothing can come out of nothing or go into nothing, is a self-evident principle which is really included in the law of causality, and ultimately in the law of identity. Accordingly, no form of energy in nature can be lost; when it changes, it changes into some other form of itself which is equal to the original form. The effect must contain as much as the cause contained, otherwise we have a loss. This principle is called the principle of the conservation of energy, which is regarded by some as a logical law, as an axiom.[1] The sum of energy in the world is constant, no energy can be added or taken away. This law is verified by experience, but it can also be logically deduced from the fundamental laws of thought. Moreover, the effect must be of the same nature as the cause, for it is after all identical with the cause. The effect is the cause in a new form, qualitatively and quantitatively equal to the cause.

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[1] Paper read at Western Philosophical Association, Lincoln, Neb., Jan. 1, 1901.

[2] I refer the reader to the following works: Sigwart, *Logic*, 2d ed., Vol. II; Erhardt, *Mechanismus und Teleologie*, 1890, *Die Wechselwirkung zwischen Leib und Seele*, 1897, *Psychophysischer Parallelismus und erkenntnisstheoretischer Idealismus*, Zeitschrift für Philosophie und philosophische Kritik, Vol. 116, No. 2; Rehmke, *Allgemeine Psychologie*, 1894, pp. 86–115, *Aussenwelt und Innenwelt*, 1898; Külpe, *Einleitung in die Philosophie*, 1895, § 18; Stumpf, Opening Address delivered at the Psychological Congress at Munich, 1896; Wentscher, *Über physische und psychische Kausalität*, 1896, *Der psychophysische Parallelismus der Gegenwart*, Zeitschrift für Philos., etc., Vol. 116, No. 2, Vol. 117, No. 1; Busse, *Wechselwirkung oder Parallelismus*, in the same journal. *Die Wechselwirkung zwischen Leib und Seele*, in *Philosophische Abhandlungen*, dedicated to Sigwart, 1900; Rickert, *Psychophysische Kausalität und psychophysischer Parallelismus*, in the same volume. Lotze, James, and Ladd also maintain the same position.

[3] See Riehl, *Philosophischer Kriticismus*, Vol. II, Part I, pp. 219–292; Vol. II, Part II, pp. 176 ff.

Now nature reveals to us two kinds of existence, mental and material, which are diametrically opposed to each other. Hence, if the foregoing laws are correct, a mental state cannot cause a physical state, nor a physical state a mental state. If the effect must be homogeneous with the cause, then mind cannot be the cause of motion, nor *vice versa*. If motion can be transformed into mind, and mind into motion, then energy is lost and energy is created, which is contrary to the law of the conservation of energy.

Other parallelists reach the same results without, however, regarding the law of the conservation of energy as an application and consequence of the principle of identity. Thus, according to Jodl, to say that mind can produce motion is to fly in the face of the law of causality and the principles following from it, that is, the law of the conservation of energy and the law of inertia. It is true these principles are not absolutely provable, they are hypothetical, heuristical principles, but we are surely not ready to give them up.[1] In the words of Paulsen: "The natural scientist would regard it as a presumptuous and impracticable demand to assume that motion is transformed, not into another form of motion, not into potential physical energy, but into something that does not exist at all physically. Transformation of motion or force into thought, into pure states of consciousness, would, for the natural-scientific view, be nothing but the destruction of energy. Similarly, the origination of motion from a purely mental element, for example from the idea of a wish, would in physics be equivalent to creation out of nothing. Consequently, he would be forced to accept the parallelistic theory instead of the other which assumes a causal relation." [2]

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[1] See Mayer, *Die Mechanik der Wärme*, quoted by Riehl, *op. cit.*

The preceding line of argument is based upon an interpretation of the principle of the conservation of energy which is rejected by interactionists as well as by many natural scientists.[3] Even supporters of parallelism confess that the law correctly understood does not contradict the theory of interaction.[4] The principle of the conservation of energy declares simply that when one form of energy seems to disappear we have in its place another form of energy (heat, for example), and that there is a constant relation between the amounts of these forms.[5] As

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[1] *Lehrbuch der Psychologie*, Chap. II.

[2] *Introduction to Philosophy* (Eng. trans.), p. 86; *Noch ein Wort zur Theorie des Parallelismus*, Zeitschrift fur Phil., Vol. 115, No. 1.

[3] See particularly: Lotze, *Metaphysik*; Sigwart, *Logic*, Vol. II, p. 97, a; Erhardt, *Leib und Seele*, Chap. II, p. 5; Stumpf, *Op. cit.;* Busse, *Op. cit.;* Mach, *Die Mechanik in ihrer Entwickelung;* Planck, *Das Princip der Erhaltung der Energie;* Ostwald, *Die Ueberwindung des wissenschaftlichen Materialismus*. Short quotations from some of these writers in Erhardt, p. 70, note 1.

[4] See König, *Die Lehre vom psychophysischen Parallelismus und ihre Gegner*, Zeitschrift für Philosophie und philos. Kritik Vol. 115, No. 2.

[5] It has therefore been suggested that the law of the *equivalence of forces* would be a better name for the principle.

Sigwart says: "The principle . . . tells us nothing as to what effects depend upon what causes, and what the conditions are under which particular causes act; it does not tell us that motion under certain conditions produces warmth, it refers only to quantitative relations, it says that where efficient action takes place this quantitative equality exists between the amount of the capacity for work represented by the effect, and the amount of the capacity for work from which the effect has proceeded, between the capacity for work which one body gains and that which the other loses. By itself it tells us nothing as to the conditions under which active energy passes into potential energy, and *vice versa;* it tells us only that when a certain motion or other change actually occurs it has been produced by active or potential energy, which must have disappeared itself in the process."[1] The law is not a self-evident axiom, one following necessarily from certain laws of thought, but the product of experience.[2] It states only what experience teaches us; namely, that whenever we have a form of motion and this disappears, it is followed by an equivalent amount of energy in another form.

Interpreted in this sense, the law does not make interaction impossible. It says nothing concerning the nature of the energy conserved, nor the source of the motion, but simply declares that when one form of energy is, so to speak, converted into another, the amount of the new form is equivalent to that of the old. If the matter rested here, there could be no objection to the theory of interaction. The interactionist might reason as follows: When a state of consciousness produces a physical change, no energy is created, for a change of consciousness is as much energy as physical energy. For the same reason no energy is lost when a physical state produces a state of consciousness.[3]

But a new law is introduced at this point, and that is this: No physical cause, it is said, can have anything but a physical effect, no physical effect can have anything but a physical cause.

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[1] *Logic* (Eng. trans.), Vol. II., p. 382.

[2] See Kroman, *Unsere Naturerkenntniss*, p. 316.

[3] Stumpf, Külpe.

Hence no psychical cause can produce a physical effect, nor can a physical cause produce a psychical effect. The two fields of existence are closed against each other; each by itself forms an unbroken causal nexus with which nothing outside of it can interfere.[1] This law of the unbroken causal nexus is said to be a generalization from experience. Experience teaches us that wherever we have a physical occurrence this is invariably preceded by another physical occurrence as its cause, hence we conclude that no physical change can take place without the action of some other physical phenomenon. There are cases, of course, in which we cannot discover all the causes and effects and measure them—as in the brain—but we assume that the same relation obtains here as in the cases where this can be done. We say that the external stimulus striking the sense organ produces some form of motion in the brain, and that this cannot be converted into anything else. Hence the sensation cannot be the product of the excitation in the brain; to say so would mean a break in the physical causal nexus and a violation of the law mentioned above. The same reasoning prevents us from assuming that a psychical state produces a physical effect.

This law, however, the opponents of the parallelistic theory refuse to accept. The law that no physical occurrence can have anything but a physical cause is not borne out by the facts, they say[2]—as is shown by the relation existing between mind and body. It is not true that physical effects can have only physical causes. States of consciousness are not physical facts, and yet they produce changes in the physical world. The so-called axiom of the unbroken physical causal nexus is an imperfect generalization from the facts of nature. It takes account only of a part of nature, the physical realm, and ignores the mental realm entirely.

With this statement of the case the opponent of interaction does not agree. He will not admit that he ignores the facts of mind in his generalization, but insists that mental states are neither causes nor effects of physical states. But, rejoins the interactionist, that is the very point at issue; you are simply begging the question here, you are assuming the very thing to be proved. You say, physical occurrences must have physical causes; I deny this and refer you to the case of the relation between mind and body. You answer that psychical states cannot produce physical states and appeal to your hypothesis according to which a physical state can have nothing but a physical state for its cause, which simply amounts to saying that psychical states cannot produce physical effects because they cannot do it.[1]

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[1] Riehl, Wundt, Paulsen, Münsterberg, Jodl, König, and others.

[2] Sigwart, Erhardt, Rehmke, Busse, Stumpf. See also Mach, and Ostwald.

Not exactly, the parallelist replies. My axiom is not a mere *ipse dixit*, but, as I said before, a generalization from experience. I say that all physical effects must have physical causes because in all cases which are open to observation I find that physical causes can be pointed out. I therefore have the right to assume that the same law holds for the movements made by conscious beings which we cannot analyze and measure on account of their complexity and minuteness. If we had eyes to see we should find the same processes taking place in the brain as we discover in coarser forms of matter. As long as you can offer no negative instance against the law that physical causes have physical effects and physical effects only, and *vice versa*, we are justified in inferring that the law is universal in its application. The relation existing between mind and body is not a negative instance against the law, but simply assumed to be such. Hence *you* are begging the question, not we. We do not know by direct observation what is the relation between mind and body, hence we have no right to refer to it in disproof of the law. In all cases that can be examined we know that no physical occurrence takes place without being caused by another of its kind, hence we have the right to infer that the same relation obtains in the brain.[2]

Some interactionists hold that even if we accept the law that no physical effect can have anything but a physical cause, interaction would still be possible. When potential energy is converted into kinetic energy, they contend, or when kinetic energy is converted into potential energy, a physical phenomenon has a physical cause or effect. Now no expenditure of physical energy is required to convert potential energy into kinetic energy or the reverse. The potential energy will not be transformed into kinetic, nor the kinetic into potential, without a cause, for nothing happens without a cause. But there is no reason why this cause should not be extra-physical. The kinetic energy could not be created out of nothing nor go into nothing; there must be a physical ground from which it comes and into which it goes. All these demands are satisfied here. The state of consciousness does not *create* the kinetic energy; the potential energy is released by a state of consciousness, and we have for the amount of potential energy in the brain an equivalent amount of kinetic energy released by consciousness.[1]

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[1] Erhardt, Rehmke, Busse.

[2] König.

This reasoning is rejected by the opponent of interaction who holds that it requires force to convert potential energy into kinetic, according to the law that no movement can be released except by another movement. A state of consciousness is not a movement, hence it cannot cause a movement. It requires physical work to set the potential energy in motion (even if we assume it to be molecular motion). To assume that mind can do this is to assume either that mind is a form of energy like motion, or that it can create motion, which is equivalent to creating something out of nothing.[2]

Well, say some of the supporters of the criticised theory,[3] the whole trouble lies in this, that you apply the law of the conservation of energy universally, whereas it does not hold for the action of souls upon things and of things upon souls. Mind can create motion, and motion can be lost when the body affects the mind. The maxim that out of nothing nothing comes, holds for physical bodies among themselves, not for the relation existing between soul and body. Every day we experience cases in which something comes from nothing; every new sensation is a creation out of nothing.

Now what conclusion shall we reach with respect to this entire question? The whole matter seems to me to hinge upon the alleged law that no physical occurrence can take place without being caused by another physical occurrence. Interpreted in the exact scientific sense, the principle of the conservation of energy does not make interaction impossible. The principle does not follow necessarily from the logical law of identity, nor is it an application of the law of causality. As a generalization from experience, it simply declares that when one form of energy disappears, another form appears, and that there is a constant mathematical relation between the two forms, so that when a certain amount of one form is transformed into another and then back again, the original amount of the first form reappears.[1] The law as such does not say that the total amount of energy in the universe must remain constant, nor does it say anything concerning the nature of the forces acting in it. To quote again from Sigwart: "Even in the physical universe from which it was obtained, and within which it is empirically proved, it states only that within a certain complex of material causes, which we assume to be a closed circle, and not influenced from without, the sum of active and potential energy remains constant; and it depends essentially upon the presupposition that within this circle we are dealing only with elements of constant forces, and with conditions of their action which are contained in the external relations of position and reciprocal motion. This principle is not violated if we assume that such a system of material masses may also enter into causal relation with elements of other kinds of force, and that the effects which issue from the forces present in it may appear also outside of its limits, or that it may be determined in particular parts by forces of a different nature. The principle states only that if, and in *so far as*, material masses act upon each other, an equation will exist between the power of work of the preceding state and that of the succeeding state. In no sense, however, that can be empirically confirmed, does it demand that every material change should have only material effects, or proceed only from material causes; the truth of a principle within a closed circle of constant material causes does not justify us in the inference that material things must, under all circumstances, form a circle closed on all sides."[1] "So long as it is not proved," says Erhardt, "that the exchange of effects which takes place between body and soul contradicts the *quantitative* relations which the law of energy establishes for the causal connections prevailing in nature, so long we have a perfect right not to let the objections based upon the doctrine of the conservation of energy shake our faith in the popular conception of the relation between body and soul."[2]

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[1] See especially Wentscher and Rehmke.

[2] Paulsen, König.

[3] See Rehmke.

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[1] We cannot, strictly speaking, say that the one form is converted into the other. All we know, for example, is that when the motion of one body ceases, the other body begins to move or becomes hot. To say that the motion has been converted into motion or heat is to make entities of these things.

Hence interaction is reconcilable with the law of the conservation of energy so long as that law is not loaded down with propositions which may in themselves be true, but do not follow from the principle itself. Let us next consider one of these propositions—the so-called axiom of the unbroken causal nexus. Nothing can happen in the physical world without being caused by a physical occurrence, it is held. The attempt is made to prove this axiom both deductively and inductively. If the cause must be equal to the effect, and if mind and matter are absolutely different, then every physical effect must have a physical cause, and every psychical effect a psychical cause. But we have no right to interpret the law of causality in this way. By cause we mean an occurrence without which another change or occurrence cannot take place, one that is necessarily connected with another occurrence called the effect. The notion of causality does not demand that the effect be identical with the cause. Of course, if we place this interpretation upon causality, we practically settle the question of interaction before we approach it. For if the like can produce the like only, and states of consciousness are not like physical states, there can be no interaction between the two fields. If however we admit the possibility of effects being produced by causes unlike them, then there is no reason on this score why a physical effect should always have a physical cause. There is another way of interpreting the causal law which makes against interaction. It is a popular notion that in order to cause anything, the cause must somehow touch the object upon which it acts. This notion is the result of our everyday experience. We produce changes in things by touching them, by pushing and pulling them around. We therefore conclude that in order to produce changes, things must touch each other, move each other, push and pull each other around. And, we go on reasoning, since mind is immaterial and cannot touch, push, and pull anything, it cannot *cause* anything. This is of course an erroneous conception of causality, one not in accordance with the facts. Acceptance of it would make impossible psychical causality and *actio in distans* in the physical world.[1]

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[1] *Logic* (Eng. trans.), Vol. II, pp. 387 ff. Erhardt, *Wechselwirkung zwischen Leib und Seele*, p. 69: "The law of energy does not tell us what forces exist in nature, nor does it give us any information concerning the elements and phenomena between which there can be reciprocal action; and the principle does not say anything about the forms into which the living energy of motion may be transformed." —Stumpf, *op. cit.*, p. 9: "When kinetic energy (living force of visible motion) is transformed into other forms of energy, and these are finally reconverted into kinetic energy, the same amount appears which was expended. The law has absolutely nothing to say of what the other forms of energy consist. And hence the psychical might easily be regarded as an accumulation of energies of a peculiar kind which have their exact mechanical equivalent."

[2] *Leib und Seele*, p. 75.

It is impossible to deduce this axiom from the law of causality. The question therefore reduces itself to a question of fact. Does experience show that no physical occurrence can take place without being caused by another physical occurrence? If we mean by the expression 'physical occurrence,' movement, then we must answer the question in the negative. Experience does not show that every movement in nature has a movement as its cause, and a movement as its effect. Experience shows, for example, that motion causes heat and electricity, and that heat and electricity cause motion. But experience does not show that heat and electricity *are* motion. We observe that when a moving body is suddenly stopped heat is produced. We are then apt to reason as follows: Motion is changed into heat; nothing can be changed into something unlike it; hence heat must be motion. Or we say: The mathematical formula expressing the action of electricity is the same as the formula for a certain mode of motion; hence electricity must be motion. But, as was noticed before, we have no scientific warrant for saying that the like must produce the like. There is no reason why the like should not produce the unlike, why heat and electricity should not be something different from motion. We do not know what heat and electricity are in their essence. Heat is a sensation, and motion is an entirely different sensation. Perhaps they are both caused by the same thing, but we have no right to assert it dogmatically. At any rate experience does not reveal it to us. Nor does it at all follow that because two modes of action may be expressed by the same mathematical formula, they are identical in essence. The mathematical formula simply expresses the temporal and spatial relations existing between things, nothing more.

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[1] See Stallo, *Modern Physical Concepts*, p. 65; Kroman, *Unsere Naturerkenntniss*, pp. 305 ff.

We do not therefore observe that every motion in inorganic nature is caused by another motion. We cannot construct an unbroken chain of mechanical causes and effects. The chain is frequently broken, and when this is the case we infer that some form of motion is present which escapes observation. We imagine that if we had suitable sense-organs, we should *see* what we see in other cases. For the same reason we assume that potential energy is molecular motion, that when mass motion disappears it continues to exist in a slightly different form. All this may be true, but we cannot say that experience teaches us that it is true.

If it is impossible to prove the mechanical theory for the inorganic world, it is still more impossible to prove it for organic processes. So far as I know no empirical proof is even attempted here. It is simply asserted that because inorganic nature is a mechanism, organic nature must be the same. The physicist applies his concepts to the whole universe, believing that what is true of his realm must be true of everything. "The majority of natural inquirers" says Mach,[1] "ascribe to the intellectual implements of physics, to the concepts mass, force, atom, and so forth, whose sole office is to revive economically arranged experiences, a reality beyond and independent of thought. Not only so, but it has even been held that these forces and masses are the real objects of inquiry, and, if once they were fully explored, all the rest would follow from the equilibrium and motion of these masses. A person who knew the world only through the theatre, if brought behind the scenes and permitted to view the mechanism of the stage's action, might possibly believe that the real world also was in need of a machine-room, and that if this were once thoroughly explored, we should know all. Similarly, we, too, should beware lest the *intellectual* machinery, employed in the representation of the world on *the stage of thought,* be regarded as the basis of the real world."

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[1] *The Science of Mechanics*, (Eng. trans.), p. 505.

Hence if the law means that no movement can take place without a movement as its cause, it is not proved, and it is not possible to base the denial of the interaction of mind and body upon it. Under these circumstances, nothing can hinder us from assuming that states of consciousness are the causes of movements. The objection to this view is based upon the notion that it takes a movement to produce a movement, and it falls to the ground as soon as this notion is given up.

But perhaps the statement that every physical effect must have a physical cause does not mean that it takes a movement to produce a movement; perhaps all we can say is that no physical change, whatever we may mean by the term, can be produced except by a physical change. This would mean that wherever we have a physical fact, that fact is conditioned by some other physical fact or facts, and that no extra-physical fact can influence a physical fact. The states in the brain, for example, which initiate muscular movements, have, as their causes, other physical states, heat, electricity, chemical processes, potential energy, etc., and no psychical state interferes with this physical causal nexus.

Even if we interpret the law in this sense we can say that experience does not prove it. For all that experience can possibly show is that there is a correlation between physical changes in the inorganic world. Experience does not show that the law is applicable to the organic world. But even if we extend the induction to embrace the organic world, what right have we to add to it the clause that no psychical element can interfere with the physical sphere? It does not necessarily follow from the fact that all physical changes have physical changes as their antecedents, that they can have *only such* changes as their antecedents. Why should not a state of consciousness be able to effect a change in the brain? Because it is unlike a brain-state? But how do we know that it is unlike a brain state? Besides, even if it were unlike a brain-state, why should it not be able to produce a change in the brain? If a physical change which is not motion can produce motion, why should not a state of consciousness produce a physical change?

We cannot, therefore, disprove interaction either on the score of the law of the conservation of energy, or on the ground that nothing but a physical change can produce a physical change. Interaction is possible; it does not contradict any really established scientific laws. Let us now turn to experience and see whether or not a causal relation between mind and body actually exists. We notice a difference in movements, even in the movements of our own body. We find that sometimes changes occur in our bodies without being preceded by our states of consciousness; at other times we find that changes occur only when preceded or accompanied by states of consciousness. Now a cause is that phenomenon without which another phenomenon cannot occur. Every change must have a cause without which it cannot take place. Since my experience teaches me that certain changes do not take place without the presence of this conscious factor of which we have just spoken, I assume that this conscious factor is a necessary element in the process, and call it a cause of the physical change. If it be said that perhaps this state of consciousness is only a helpless accompaniment of the physical change, that the physical change would have taken place without it, I answer: Since the physical change occurs only when the mental factor is present, and does not occur when the mental factor is absent, it is but fair to suppose that the physical change could not occur without the mental element.

This does not mean that a state of consciousness *creates* a state of movement, or that a movement *creates* a state of consciousness. The state of consciousness does not create a movement out of nothing, any more than a movement creates another movement out of nothing; without a physical apparatus no movement would take place. The state of consciousness is not a cause in the sense of producing or creating anything out of itself. It is a cause in the sense of being an element without which another element called a physical occurrence cannot take place. The movement cannot take place without the presence of other physical states—Shakespeare could not have written his plays without hands—and in so far as this is true these states also form a part of the cause. But we have the right to fix our attention upon one of the factors in this process which we regard as the most important, and to call this the cause.[1] It is no argument against this fact to say that we do not know *how* a state of consciousness can be the cause of a physical change. We do not know *how* one physical change produces another physical change, *why* or *how* a moving body causes another body to move; all we know is that when one body moves and strikes the other, the other also moves, and so we say and have a perfect right to say that the first body moves the second. The question we have to settle here is a question of fact; for example, what happens when I make up my mind to move my arm, and would my arm have moved without my having made up my mind to move it? and this question I can safely answer by declaring that my volition is the cause of the movement of my arm in the sense of being the necessary antecedent of the movement. Experience teaches me that my states of consciousness cause movements, just as much as experience teaches me that movements cause other movements. Of course, it is possible that states of consciousness are not the causes of movements after all, that they only *seem* to be, that an unknown element pushes itself in between the state of consciousness and the movement, and that this element is the real cause of the movement, and that the state of consciousness is merely a helpless concomitant of this unknown element, as parallelism would have it. But it is also possible that a conscious element is the real cause of all movements in the inorganic world, that when one movement seems to cause another movement here, this is only because we do not observe the real cause, a psychical element which pushes itself in between the first movement and the second movement. We have no right to doubt what seems to be an observed fact unless that fact contradicts some firmly established law. Parallelists deny interaction because they believe it contradicts the law of the conservation of energy, the causal law, and the alleged law that no physical occurrence can have anything but a physical occurrence as its cause. But interaction does not contradict the first two laws properly understood, and the last law is not true. The old-fashioned thinker reasoned by analogy that, because his consciousness caused movements, consciousness was the sole cause of movements in the world. The new-fashioned thinker reasons by analogy that, because physical changes cause movements in the inorganic world, physical changes must be the sole causes of movements in the organic world.

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[1] See Mill, *Logic*, Bk. III, Ch. V, 3.

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